Kentucky Geological Survey
UNIVERSITY OF KENTUCKY

Kentucky Geology

Earth Resources—Our Common Wealth

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Kentucky Geological Survey
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Our mission is to increase knowledge and understanding of the mineral, energy, and water resources, geologic hazards, and geology of Kentucky for the benefit of the Commonwealth and Nation.

In this issue

Celebrating the 30th anniversary of the Apollo 17 mission

Apollo astronaut and geologist Harrison Schmitt visits KGS

In celebration of the 30th anniversary of the Apollo 17 mission to the Moon, Apollo astronaut and geologist Harrison "Jack" Schmitt was a guest of the Kentucky Geological Survey and distinguished lecturer at the University of Kentucky. His keynote address, "A Trip to the Moon," attracted more than 1,200 adults and children to the Singletary Center for the Arts on October 11, 2002.

Thirty years ago on December 11, 1972, Schmitt and fellow astronaut Eugene Cernan landed on the Moon's surface aboard Apollo 17, the final manned lunar landing mission. The previous Apollo missions, which began with the landing of Apollo 11 on July 20, 1969, had fulfilled President John F. Kennedy's challenge to America on May 25, 1961, to land a man on the Moon before the end of the decade. Having met this remarkable goal, NASA turned its attention to using the subsequent Apollo missions to gain a better scientific understanding of the Moon and its relationships to the terrestrial planets.

Schmitt was the only scientist to set foot on the Moon. He and Cernan spent 22 hours on three excursions on the Moon's surface exploring a 2,300-meter-deep valley that was 50 kilometers long in the region of the Taurus Mountain ring near the crater Littrow. The results of the exploration of this valley, as well as other lunar sites in the previous Apollo missions, contributed to scientific debate and discussion about the

(continued on page 2)

Grand reopening of the Publication Sales office

Embracing the digital world to enhance public access and service

The Publication Sales office of the Kentucky Geological Survey celebrated its grand reopening on October 16, 2002, during Earth Science Week. The office has been expanded beyond its original role of selling traditional maps and publications, and now includes computers for customers to access oil, gas, coal, and water well records from KGS databases. Real-time seismic recordings from 10 seismic stations across Kentucky can also be viewed online. These changes are essential for enhancing public access to data, maps, and publications available at KGS, as well as providing products and services in a user-friendly way to a broader and more diverse customer base.

If travel to Lexington is inconvenient or the retrieval of data is time-sensitive, customers can call our new customer service desk and receive assistance in retrieving the required data online.

The office maintains an inventory of KGS and U.S. Geological Survey maps and publications. Paper copies of topographic and geologic maps for Kentucky are also available. **Roger Banks,** one

(*continued on page 5*)

Susan Rainey, a visitor from Cynthiana, Ky., draws three winning tickets for the door prizes offered at the grand reopening of the Publication Sales office.

Director's Desk

Throughout our 163-year history, serving the public has been central to the mission of the Kentucky Geological Survey. The way in which we serve the public has changed dramatically over time, however. Historically, our geologic reports were written by experts, for experts, and in technical language. These publications were never intended to be read by the general public. Today, we understand the importance of communicating in a manner that can be understood by all citizens, not just experts. The World Wide Web and new computer software has enabled us to distribute unprecedented amounts of geologic information, data, maps, and publications.

The Web has had an equalizing influence by allowing experts and novices alike to access vital information with only a few keystrokes. Using the searchable databases on our Web site, anyone can type key words such as "oil and gas," "water," "coal," or "earthquakes" and access our data, as well as more than 5,000 publications and maps.

Although geology and geologic hazards affect residents throughout Kentucky, fewer than 1 percent of Kentuckians are professional geologists or educators in geology. Another small percentage of citizens has studied geology, and many people read books about geology, watch geologic programs on TV, and are aware of geologic issues. Unfortunately, many citizens do not know where and how to access the data they need. Our challenge and priority is to make people aware of what information we have and explain how it can help citizens in all walks of life.

Increasingly, people are using the Web for many purposes (shopping, banking, medical information, travel planning, and so on). The geologic community must also embrace this technology in order to provide widespread pubic access to vital geologic information. I am committed to providing customer-friendly access to more and more of our data, reports, publications, and maps. I welcome your ideas about how we can continue to enhance our online public service for the benefit of citizens across the Commonwealth.❖

Seismic experts meet in Lexington to discuss seismic risk and building design codes

On November 18, 2002, KGS, the Central U.S. Earthquake Consortium State Geologists, and the Governor's Council for Earthquake Risk Reduction sponsored a workshop on seismic hazard maps for the central United States produced by the National Earthquake Hazard Reduction Program (NEHRP). The workshop, held in **Lexington,** attracted more than 110 participants from local, State, and Federal governments across the Nation. The map developers (the U.S. Geological Survey and the Building Seismic Safety Council) and the map users (engineers, seismic-safety regulators, public officials, emergency managers, and planners) discussed seismic hazards, risk, and design in the central United States, with particular attention focused on Kentucky.

The workshop speakers included seismologists, geologists, and engineers from government agencies, universities, and private industry. The keynote speakers were **Arthur D. Frankel,** project chief for the National Seismic Hazard Mapping Project of the U.S. Geological Survey, and **R. Joe Hunt,** chair of the Seismic Design Procedures Group of the Building Seismic Safety Council that developed the NEHRP97 seismic-design maps.

For more information, contact **John Kiefer** at 859.257.5500 ext. 145 or by e-mail at kiefer@kgs.mm.uky.edu.❖

(Astronaut Harrison Schmitt, *continued from page 1)*

origin and evolution of the Moon and the planets. Schmitt explained to the audience at UK that the results also provided a new energy option that may meet future needs in the 21st century—fusion power fueled by helium-3 from the Moon.

Prior to his public lecture, Schmitt met with representatives of the media, gave a scientific talk on the origin of the Moon and Mars, and visited faculty and students in the College of Engineering.

Schmitt predicted that some time in the next 30 years we will return to the Moon, using funding from the private sector. Although the Apollo missions were spurred by a presidential mandate and political objectives, future missions to the Moon will likely be spurred by private-sector interests in developing helium-3 and other economically valuable products.

Schmitt is currently an aerospace and business consultant and an adjunct professor of engineering at the University of Wisconsin–Madison.❖

Field notes from across Kentucky

Accessing Kentucky mine map information

In September 2001, KGS hosted a meeting of State and Federal agency representatives to discuss the creation of an information system for accessing information on Kentucky mine maps. This meeting was convened in response to impediments to obtaining mine maps in the aftermath of the **Martin County** slurry pond failure. As a result of the meeting, teams were formed to explore legal and technical solutions for providing mine map information to government personnel, as well as the general public. **Jerry Weisenfluh** represents KGS on the technical team.

The legal team proposed changes to Kentucky law regarding accessibility of mine maps. The law was successfully modified to permit public access to mine maps held by the Kentucky Department of Mines and Minerals for any closed and abandoned mine.

The technical team reviewed existing information systems and holdings of the Kentucky Department of Mines and Minerals, Kentucky Department of Surface Mine Reclamation and Enforcement, Kentucky Revenue Cabinet, U.S. Office of Surface Mining, and KGS. A proposal was made to develop a Web-based information system that would consolidate access to all this information in a graphical map service, and a prototype was developed for a small area. Funding is being sought from State and Federal agencies to implement the system. For more information, contact Weisenfluh at 859.257.5500 ext. 114 or by e-mail at jerryw@kgs.mm.uky.edu.

Protecting water quality at Royal Spring, Georgetown

Jim Currens and **Randy Paylor** received a grant through the Royal Spring Water Supply Protection Committee to determine time of travel for groundwater in the Royal Spring Basin. Royal Spring provides water for the city of **Georgetown.** Dye will be injected into swallow holes, under a variety of different flow conditions. Multiple dye traces are needed from each injection point because flow velocities vary with precipitation. A set of maps showing the minimum number of hours it will take for a water-soluble contaminant to reach Royal Spring will be produced. Each map will be related to the stage on a staff gauge at Royal Spring, which will be read by Georgetown Municipal Water & Sewer Service (GMWSS) staff.

If a pollution spill occurs on any of the highways that cross the basin, such as I-64, I-75, or U.S. 27, as well as the railroad, and the time the spill occurred is reported to GMWSS, then the arrival time can be predicted, based on the location in the basin, and the reading on the staff gauge. If the arrival time of the contaminant is known, the water intakes can be closed until the contaminant passes, minimizing the cost for temporary replacement supplies.

The grant is funded by GMWSS. For more information, contact Currens at 859.257.5500 ext. 160, or by e-mail at currens@kgs.mm.uky.edu.❖

Spotlight on new publications

Updated karst groundwater basin map

In response to increasing demand for water resources and a concern about environmental protection of groundwater in areas with karst terrain, an updated karst groundwater basin map for the Lexington 30 x 60 minute quadrangle has been published. KGS hydrogeologists **Jim Currens** and **Randy Paylor,** and **Joe Ray** of the Kentucky Division of Water, are coauthors.

The map shows sources of springs in the Inner Bluegrass Region, which are an important water supply in rural areas, especially during droughts. A large percentage of livestock, and many people, in central Kentucky get their drinking water from springs or wells. But runoff from highways, industry, agricultural activity, and urban development can rapidly pollute groundwater in karst areas. Chemical pollution of a spring can happen without warning, threatening livestock and human health. The map will help emergency response crews as they assess and remediate pollution incidents. They will also be useful for private citizens looking for the source of water for springs, water-supply managers, land-use planners, and those conducting environmental assessments.

The map can be downloaded as a PDF file from the KGS Web site at www.uky.edu/KGS/pubs/lop.htm or it can be purchased from the KGS Publication Sales office by calling 1.877.778.7827. For more information about karst, contact Currens at 859.257.5500 ext. 160 or by e-mail at currens@kgs.mm.uky.edu.❖

—by Trish Roskam, Communications Intern

pH in Kentucky groundwater

A new Information Circular by **Steve Fisher** about pH of groundwater has been published. Fisher says that "KGS is producing a series of maps that show the quality of groundwater throughout the state. This latest map summarizes data for pH, which is a fundamental measure of groundwater acidity or alkalinity. Many important properties of water are determined by pH. For example, both the suitability of groundwater for various uses and the ability of water to transport potentially harmful chemicals depend on pH. The map and data summaries in "Groundwater Quality in Kentucky: pH" show that pH values in groundwater are primarily controlled by bedrock geology and physiographic region." For more information, contact Fisher at 859.257.5500 ext. 158 or by e-mail at sfisher@kgs.mm.uky.edu.❖

—by Trish Roskam, Communications Intern

In memory:

Frank H. Walker, February 21, 1925–December 6, 2002

After graduating from Berea College in 1948, Frank H. Walker came to the University of Kentucky to pursue a master's degree in geology on the GI Bill. He arrived on campus in time to witness the fire that consumed the offices of the Kentucky Geological Survey and all its records. While a student, he worked at the Survey and helped State Geologist Dan Jones restore the well record file. From 1950 to 1957, Frank was an oil scout for KGS, collecting subsurface and completion data on wells being drilled in western Kentucky. In 1957, he left KGS for the Indiana Geological Survey in Bloomington. In 1960, the Kentucky Legislature enacted KRS 353, an act to promote oil and gas conservation and development. Frank accepted a position as the director of the newly created Division of Oil and Gas. As its first director, Frank established many of the permitting and record-keeping practices still in force.

Frank retired from the Division to Florida in 1974. Walking the beaches and collecting shells wore thin, and he soon returned to Kentucky. In 1976, he joined the KGS staff once again. This time, he took charge of the oil and gas well records file. His first major duty was to supervise the move from the Mineral Industries Building to Breckinridge Hall on UK's campus. After the retirement of Ed Wilson, Frank began inventorying Ed's file of Kentucky oil and gas wells that penetrated the pre-Trenton, aiming to incorporate Ed's privately collected information into the main well data file for the benefit of the public. These original "deep test" data have become the basis of many subsurface investigations at the Survey.

I joined the well record room staff in 1978, and Frank put me to work on processing incoming permit applications and new well completions. Frank soon became a helpful, but truculent, guinea pig for the design and implementation of an electronic database of oil and gas well data. As that database slowly replaced the old farm card file, Frank took advantage of the "infernal machine" to the extent needed to find well data. He always threatened that the fix was the shotgun he was going to bring in if the system broke one more time. The pre-Trenton and Letcher County well data sets compiled by Frank went through several generations before a final data format was established.

In the early 1980's, Frank was asked to evaluate methods for archiving the oil and gas well records. This led to the first phase of the scanning project. Frank and Jean Kelley moved into renovated space in the Small Animals Building (affectionately known as the "Dead Animals Building") on campus, where they inventoried and scanned data for EPA Class II (secondary recovery injection) wells under an EPA Underground Injection Control grant. These scanned images became the basis of the Web-based oil and gas well record data file implemented in 2002. When Frank retired (again) in 1990, he left a legacy of well-organized subsurface data that continue to be of service to the public on a daily basis.❖

—by Brandon Nuttall

New features in KGS online publications and maps database

Several new features have been added to the KGS online data and publications database at www.uky.edu/KGS/pubs/lop.htm:

- Searches for a publication or map can now be made by geographic area (for example, different size quadrangles, cities, towns, and counties). Index maps are embedded on the page to help with this search.
- A new index map tool has been added to help with the data searches for coal, oil and gas, and water well records. When you search by either quadrangle or county, a link will allow you to choose an area of interest on a state index map. A new window with a detailed map of the area of interest will then open. The selected map area will automatically be entered on the original search criteria page.
- On the "Results" page the "Previous" and "Next" links have been removed and replaced with page numbers. This will allow you to advance to a particular page.
- The "Results" page has been color-coded based on data, maps, or publications.

What's next? Look for these new features in early 2003:

- New coordinate conversion routines will permit you to download coal, water, and oil and gas data in a coordinate system of choice—UTM, State Plane, Geographic, or the new Kentucky Single Zone in either NAD27 or NAD83.
- The coal borehole database search will be enhanced to allow you to also download the associated stratigraphic data.
- The coal thickness data search will include scanned images of "coal cards," many of which show detailed measured sections not provided in the database.
- A new search page will allow you to find information about core and cutting holdings at the KGS Well Sample and Core Library.
- A new search page will help you find information about Kentucky springs.
- Another new search page will help you find coal-quality information.

If you have any comments or suggestions about these updates, please contact **Doug Curl** at 859.257.5500 ext. 140, or by e-mail at dcurl@kgs.mm.uky.edu.❖

Awards

Drahovzal receives A.I. Levorsen Memorial Award

On October 2, 2002, **Jim Drahovzal** received the A.I. Levorsen Memorial Award for the best paper presented at the 2001 meeting of the Eastern Section of the American Association of Petroleum Geologists. The award was for his paper on carbon sequestration, "Midcontinent Interactive Digital Carbon Atlas and Relational Database (MIDCARB)." His coauthors were Lawrence H. Wickstrom, Timothy R. Carr, John Rupp, Beverly Seyler, and Scott W. White. Drahovzal also received this award in 1997.❖

KGS staff members receive awards for mentoring students in applied geology

On October 27, 2002, at the annual meeting of the Geological Society of America, in Denver, Colo., **John Kiefer**, **Ed Woolery**, **Drew Andrews**, and **John Hickman** were granted awards for serving in the 2002 Roy J. Shlemon Mentor Program in Applied Geology. In this program, professional geologists mentor undergraduate and graduate students, providing advice to assist them in preparing for careers in applied geology.❖

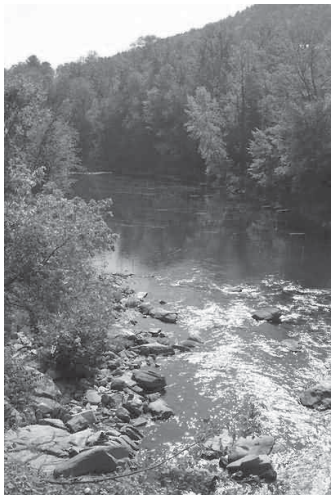
Bringing geology to the agricultural districts

Glynn Beck and **Bart Davidson**, geologists from the Henderson and Lexington offices of KGS, respectively, have been visiting Federal and State officials of the Area Development Districts, Resource Conservation and Development Councils, and Natural Resources Conservation Service. The purpose of their visits has been to demonstrate new map products and developments in online data capabilities at the Survey, and to determine how KGS can better serve the needs of these agencies. As of December 2002, they have visited five Area Development District offices and five Resource Conservation and Development offices in western Kentucky; during the next few months, they plan to visit the remaining offices across the state. If you are interested in learning about new map products and GIS applications using online data services available from KGS, please contact Bart Davidson at 859.257.5500 ext. 162 or by e-mail at bdavidson@kgs.mm.uky.edu.❖

Water-quality monitoring at Kentucky Army National Guard training sites

Carlos Galcerán received a grant of $268,000 from the Kentucky Department of Military Affairs and the Kentucky Army National Guard for a 2-year study of water quality at some of the Guard's training facilities. Galcerán is conducting a long-term monitoring program for surface water to establish baseline conditions that will permit the Guard to assess what effects their maneuvers and other activities have on quality in ponds and streams over time. The study will also examine whether or not the quality of the groundwater recharging the surface water is the significant factor in quality variations at the surface-water sites.

Groundwater quality and fluctuations in water level in coal-mine spoil at the training facilities are being monitored through wet and dry seasons. The research results will define why water quality varies, how fast and in what direction water is moving, and greatly aid in implementing land-use policies to minimize, and even correct, adverse water quality at the facilities. Water-supply wells surrounding one of the sites are being studied to document water quality and groundwater levels. Tissue from fish in appropriate lakes is being studied to determine the long-term, cumulative effect of the present water quality on the ecosystem. Streambed sediments are being surveyed in selected locations to determine if sedimentation is one of the major causes of the degradation of quality in streams. All data collected are being integrated into a geographic information system database. For more information, contact Galcerán at 859.257.5500 ext. 155 or by e-mail at galceran@kgs.mm.uky.edu.❖



*(**Grand reopening of the Publication Sales office**, from page 1)*

of the staff in the Publication Sales office, notes that "customers can now search for oil, gas, and water well records, as well as generate custom topographic maps using National Geographic software."

William Briscoe, manager of the Publication Sales office, explains that as a service to the Kentucky Department of Transportation, KGS is a sales outlet for county maps, city maps, traffic count maps, and general highway maps produced by the transportation department.

The next time you visit the UK campus, come and explore the renovated Publication Sales office. Hours are Monday through Friday, 8 A.M. to 5 P.M. You may also call 859.257.3896 for information. Customers from outside Lexington may call toll-free at 1.877.778.7827 to order a publication or map.❖

Coming in the spring 2003 issue of *Kentucky Geology:* an *In Focus* feature on earthquake risk, seismic hazard maps, and building codes.

KGS mailing list

Would you like to receive the KGS newsletter and announcements of meetings and new publications? Please call us at 859.257.5500 or send an e-mail message to **Carol Ruthven** at cruthven@kgs.mm.uky.edu—simply type "Electronic-Mailing List Addition" in the subject line of your message, type your mailing address and phone and fax number in the message—and we will include your name and address in our mailing list.❖

Calendar of events

- **March 12–14, 2003:** GSA South-Central and Southeastern Section joint meeting, Memphis, Tenn., www.geosociety.org/sectdiv/southc/03sc-semtg.htm
- **May 11–14, 2003:** American Association of Petroleum Geologists annual meeting, Salt Lake City, Utah, www.aapg.org/meetings/slc03/index.html
- **May 16, 2003:** KGS 43d annual seminar, Lexington, Ky.
- **September 6–10, 2003:** American Association of Petroleum Geologists–Society of Petroleum Engineers 2003 Eastern Meeting, Pittsburgh, Penn., www.aapg-spe-2003.org/
- **November 2–5, 2003:** Geological Society of America annual meeting, Seattle, Wash., www.geosociety.org/meetings/2003/ ❖

Education outreach

Jim Currens spoke to a group of local officials and citizens in **Hopkinsville** on November 25, 2002, about the causes and possible remedies for a rash of cover-collapse sinkholes in Hopkinsville. Currens was invited by Paul Howell of the state office of the Natural Resources Conservation Service (NRCS), and hosted by Lorin Boggs, an NRCS conservationist for **Christian County.** Steve Bourne, Director of the Hopkinsville/Christian County Planning Commission (HCPC), and J.D. Lingenfelter, code enforcement for the HCPC, also attended the afternoon meeting.

A presentation given in the evening by Currens was attended by about 25 people, including NRCS, agricultural extension, and HCPC staff, as well as local citizens.

If you have questions about karst in your community or would like more information, contact Currens at 859.257.5500 ext. 160, or by e-mail at currens@kgs.mm.uky.edu.❖

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